



National Agriculture Imagery Program (NAIP)

John Mootz, Contracting Officer

2008 Civil Commercial Imagery Evaluation
Workshop

3/26/2008





Topics

- **What is NAIP**
- Program History
- Current Program
- Improvements/Ongoing Pilots
- Future



What is NAIP?

- Annual coast-to-coast program
- Quarter-quad based orthos
- 1m and 2m resolution
 - 5-year cycle for 1m base replacement
- Leaf-on, peak-growth
- Very rapid, aggressive collection

ALL IMAGERY PLACED IN PUBLIC DOMAIN



Contract Deliverables

- Full-resolution DOQQ tiles
 - GeoTIFF
 - NAD83, UTM
- Compressed County Mosaics (CCM)
 - MrSID compression (moving to JPEG2k)
 - Radiometric balanced
 - Projected in predominant UTM



Acquisition Requirements

- 10% clouds or less
- Free of standing water
- Minimum 30° sun angle
- Minimize specular reflections
 - Especially in agriculture areas



DOQQ Requirements

- Most current version of NED
- 300m (± 30) buffer
- No non-imagery (borders, fiducial)
- May mosaic imagery
 - Radiometric balance within tile
 - ± 3 pixel offset requirement
- Horizontal Accuracy
 - Relative: ± 5 m on 90% well-defined pts



DOQQ Requirements (con't)

- Prefer not to “radiometrically balance”
 - Minimize color data lost
- New “histogram” requirements
- 1 pixel limit on band-to-band misregistration
- List of acceptable blemishes
- Band order: RGB, NRG, or RGBN



Topics

- What is NAIP
- **Program History**
- Improvements/Ongoing Pilots
- Future



2002 Pilot Program

- Pilot compared 35mm to imagery from mapping cameras
 - 1m - ortho
 - 2m - geo-rectified



2003



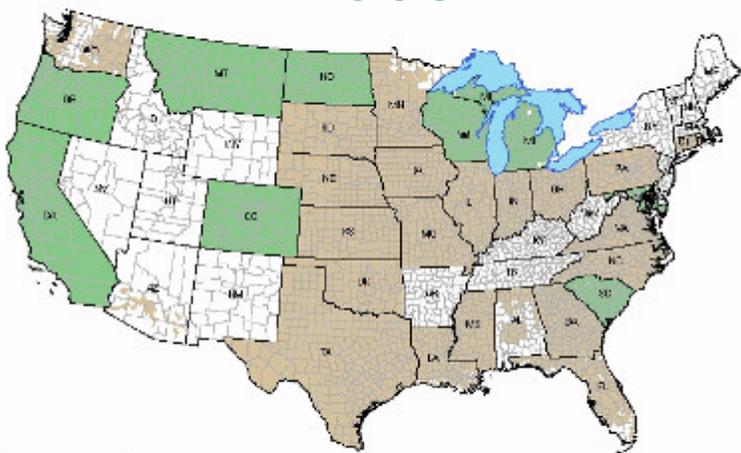
USDA/FSA/APHIS

2004



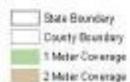
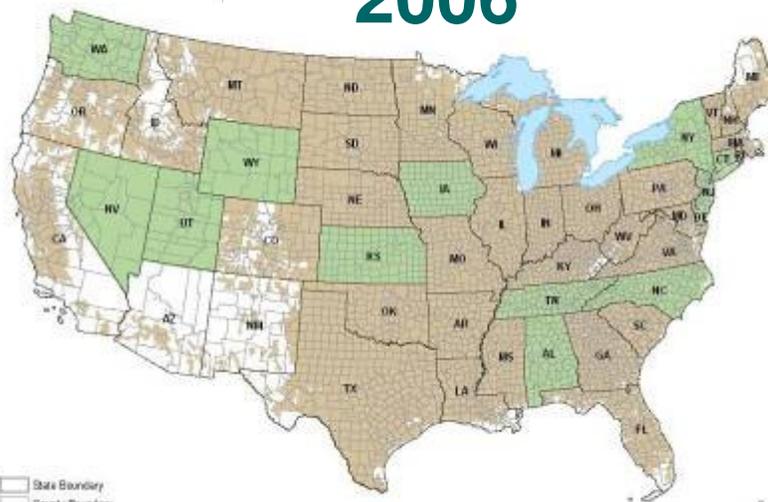
USDA/FSA/APHIS

2005



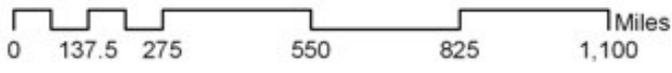
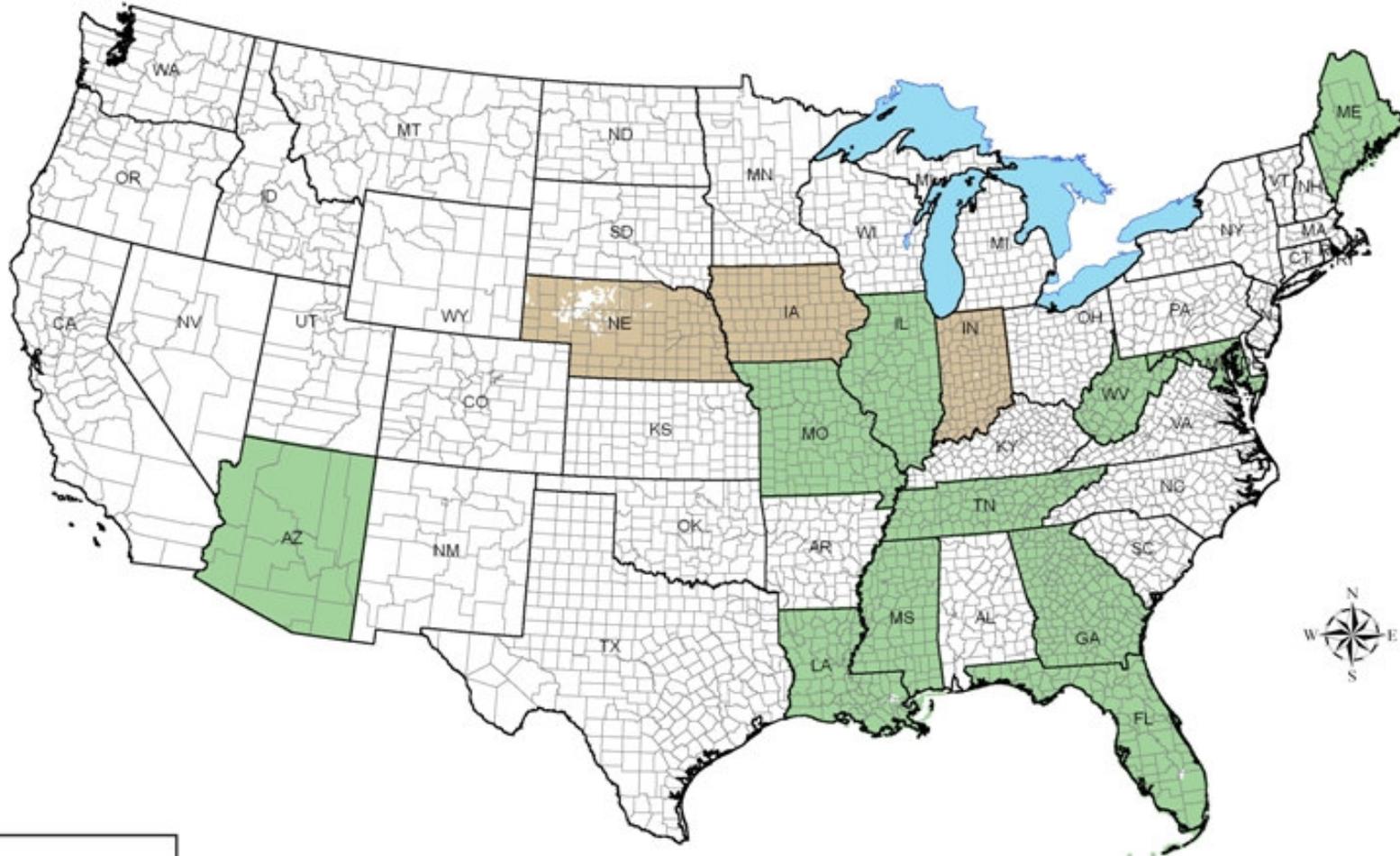
USDA/FSA/APHIS

2006



USDA/FSA/APHIS

2007 NAIP Coverage





Topics

- What is NAIP
- Program History
- **Improvements/Ongoing Pilots**
- Future



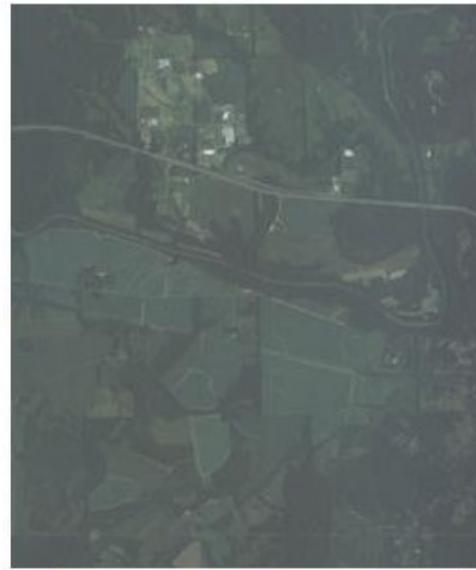
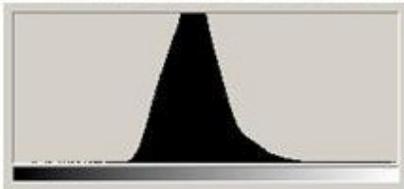
Improvements/Ongoing Pilots

- Radiometric improvements
- Absolute horizontal accuracy
- Seamline shapefile
- 4-band imagery
 - Requires new compression

Radiometric Improvements

- Problem: Quality was not consistent

Actual NAIP imagery (2004-2006)





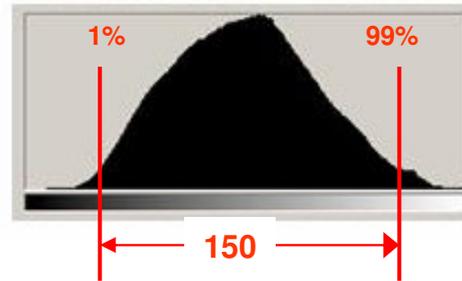
Radiometric Improvements (con't)

- Solution: Develop new radiometric specifications
- ITT Space Systems contracted
 - Conducted user sensitivity study
 - “Best Practices” document
- Implemented 4 histogram specs
- Require “pre-production” sample from contractor



Radiometric Improvements (con't)

- Clipping: $<2\%$ ($<1\%$ preferred)
- Contrast:
140 – 160
(150 goal)
- Histogram Peak: $\pm 15\%$ of middle
(108-148 for 8-bit)
- Color: RGB triplet within ± 5

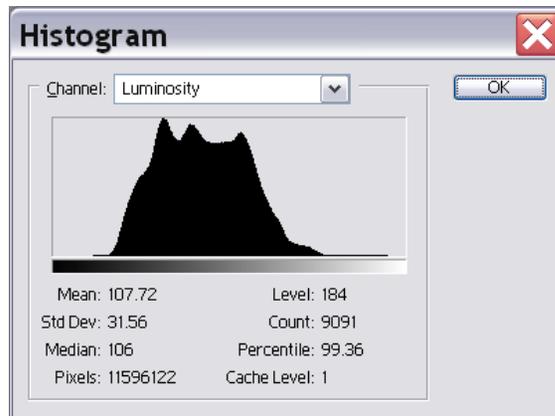


There is no perfect histogram but these specifications are a good start



Radiometric Improvements (con't)

Original 2006



Clipping – 0%

Contrast – 131

Histogram Peak – 80

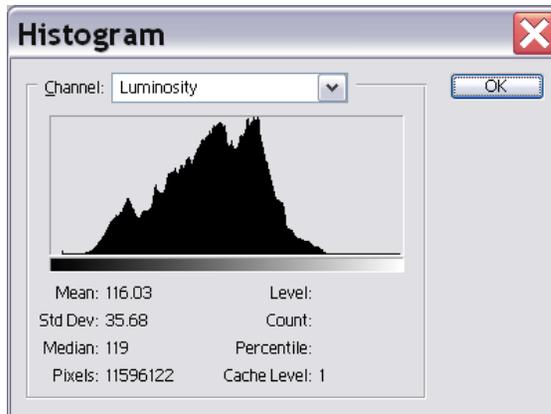
Color Balance (RGB) – 147,128,105





Radiometric Improvements (con't)

Adjusted 2006

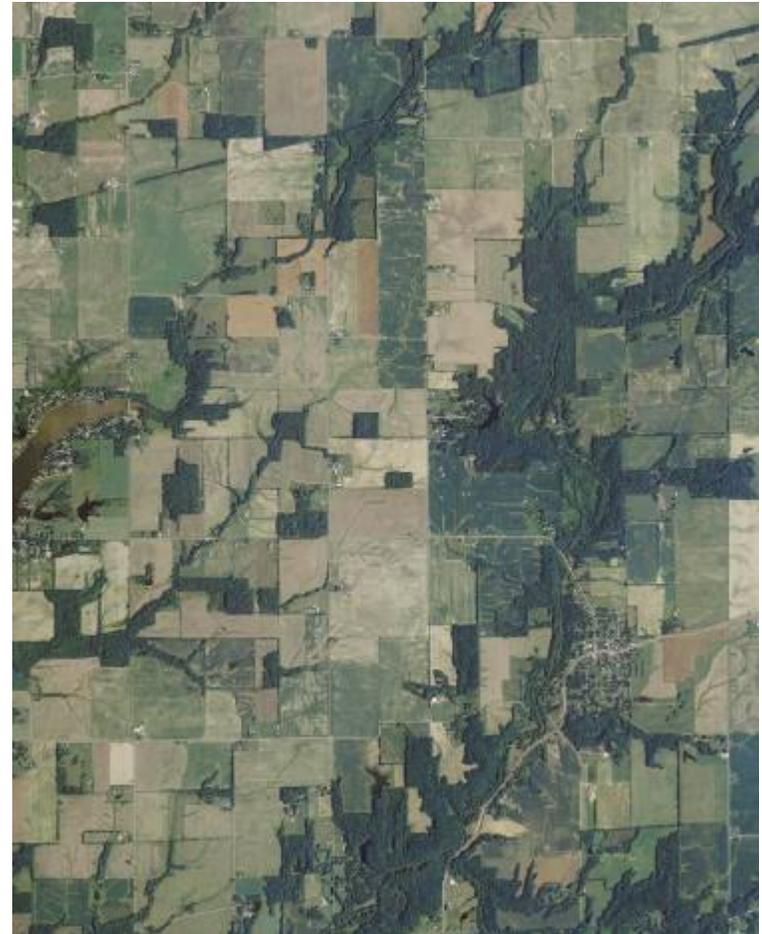


Clipping – 0.02%

Contrast – 151

Histogram Peak – 147

Color Balance (RGB) – 192,194,191





Absolute Horizontal Accuracy

- Large investment in CLUs required relative accuracy
 - Tied to the original 1990s "MDOQ"



2008 Civil Commercial Imagery
Evaluation Workshop



Absolute Horizontal Accuracy (con't)

- Need for absolute identified
 - Partners were requesting change
 - Dataset accuracy is better described (valuable)
- Pilots were conducted in 2006 (UT) and 2007 (AZ)
 - AZ: 2.87m RMSE (530 check points)
- Future states will be phased in
 - Once converted, state will not revert
 - 7 new states are planned for 2008



Absolute Horizontal Accuracy (con't)

- Working with other federal and state agencies to create a photo identifiable control database for QA check points
- Should this become a “national” database available to others?



Seamline Shapefile

- FSA Users require a CCM shapefile
 - Shows area of mosaic coverage
 - QQ based, rectangular polygon
 - Attributed with image acquisition date
- Not an issue with 1:40,000 film
- Direct digital acquisition requires mosaicking of several images
 - Attribute is single field (majority date)

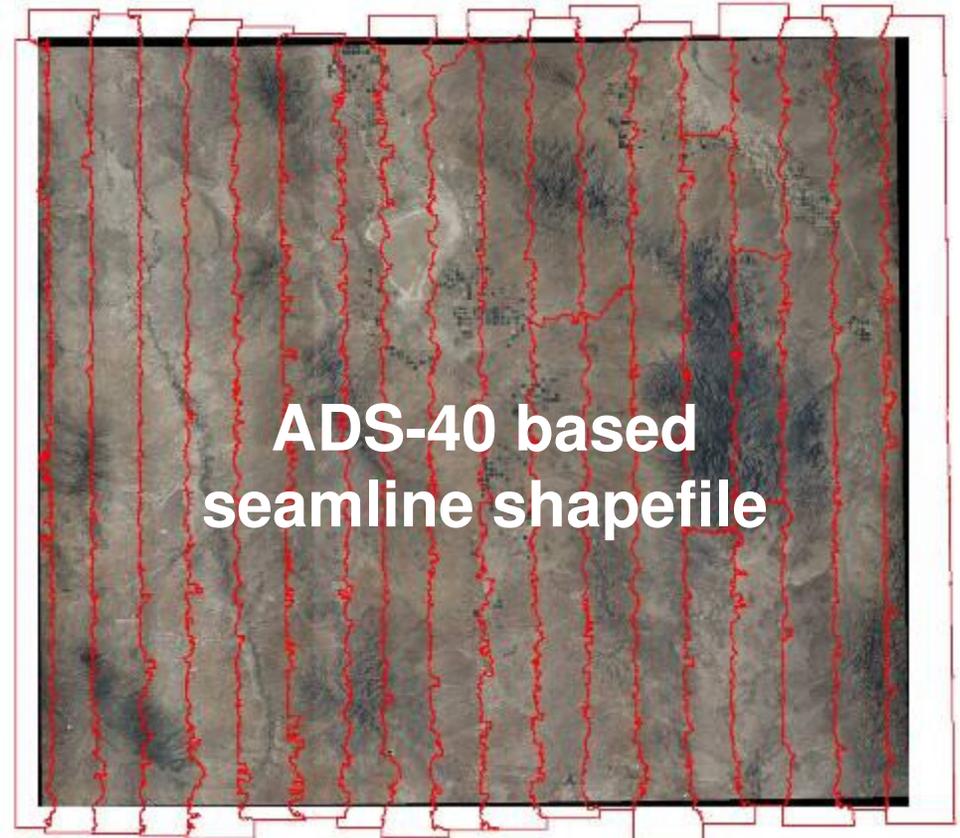
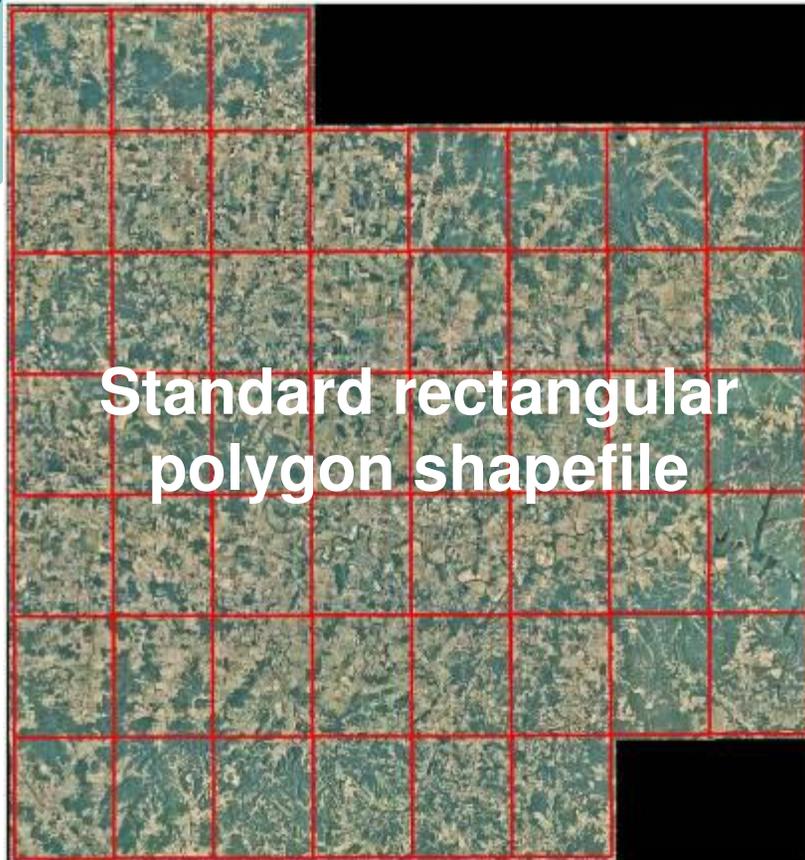


Seamline Shapefile (con't)

- Successful pilot was conducted in 2007 (Arizona) using ADS-40
- Will expand seamline shapefile requirements in 2008
 - Test different digital camera footprints
 - Resolve “unknowns” before proceeding to all states

Seamline Shapefile (con't)

2007 NAIP (TN)



2007 NAIP (AZ)



4-band Imagery

- Natural color is default
 - FSA state office or partner could request false color IR
 - 2003 - MO; 2004 - IL,PA,TX; 2005 - MI; 2006 - TX
- Conducted 4-band pilot in AZ during 2007
 - ADS-40 with new head (SH-52)

4-band Imagery (con't)

2007 NAIP (AZ)

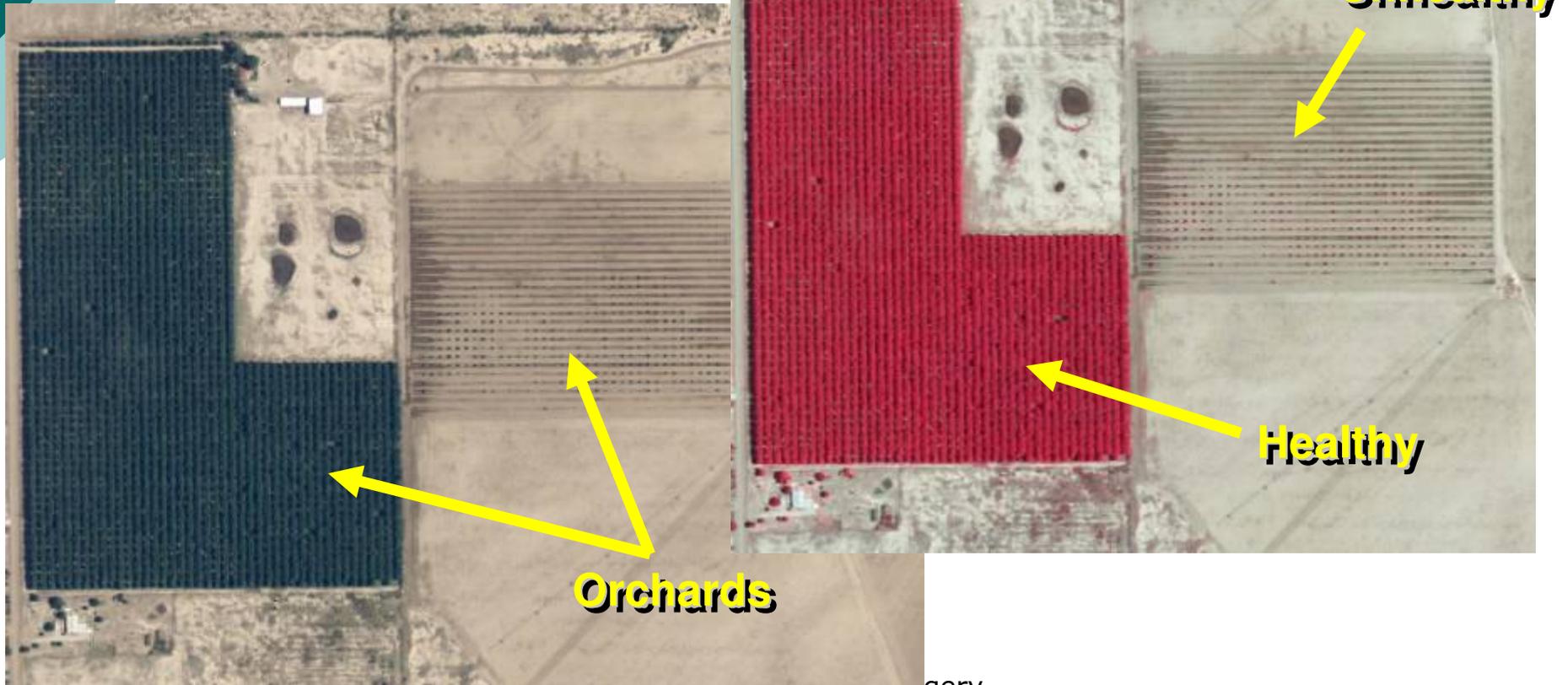


3/26/2008

2008 Civil Commercial Imagery
Evaluation Workshop

4-band Imagery (con't)

2007 NAIP (AZ)





4-band Imagery (con't)

- LizardTech™ MrSID compression does not support 4-band imagery
 - CCMs in the 2007 pilot were delivered as NC 3-band
- 2008+ all 4-band CCMs will be compressed using JPEG2000
 - RFI was released Nov 07 asking for end user/industry input on settings
 - Settings were published in 2008 RFP



Topics

- What is NAIP
- Program History
- Improvements/Ongoing Pilots
- **Future**



Future

- 2m coverage has been dropped
- 5-year cycle may become shorter
- Proposed new coverage rules being review at FSA headquarters
 - Limited to CLUs areas only (2009) – i.e. no more border-to-border coverage
 - Unless cost-share partner is identified



Partnership Opportunities

- Add DOQQ coverage to FSA req'ts
 - Areas must be contiguous and/or substantial size
- Add 4th band
- Out-of-cycle years

Other products can be contracted directly with the NAIP contractor





NAIP Points of Contact

- **Programmatic**
Kent Williams – Program Coordinator
801-844-2908 kent.williams@slc.usda.gov
- **Contract Information**
John Mootz – Contracting Officer
801-844-2916 john.mootz@slc.usda.gov
- **Technical**
Brian Vanderbilt –Service Center Support Branch Chief
801-844-2930 brian.vanderbilt@slc.usda.gov
- **Partnership Information**
Cindy Sessions – Partnership Coordinator
801-844-2909 cindy.sessions@slc.usda.gov
- **Quality Issues/Problems**
Brenda Simpson – Quality Assurance Branch Chief
801-844-2960 brenda.l.simpson@slc.usda.gov

NEW PHONE NUMBERS



Backup charts

- Data Sources
- CLU information
- 2008 NAIP Acq Periods
- 2008 NAIP Coverage
- NAIP Acquisition Rate
- Digital vs Film Totals
- Direct Digital Capture



Data Sources

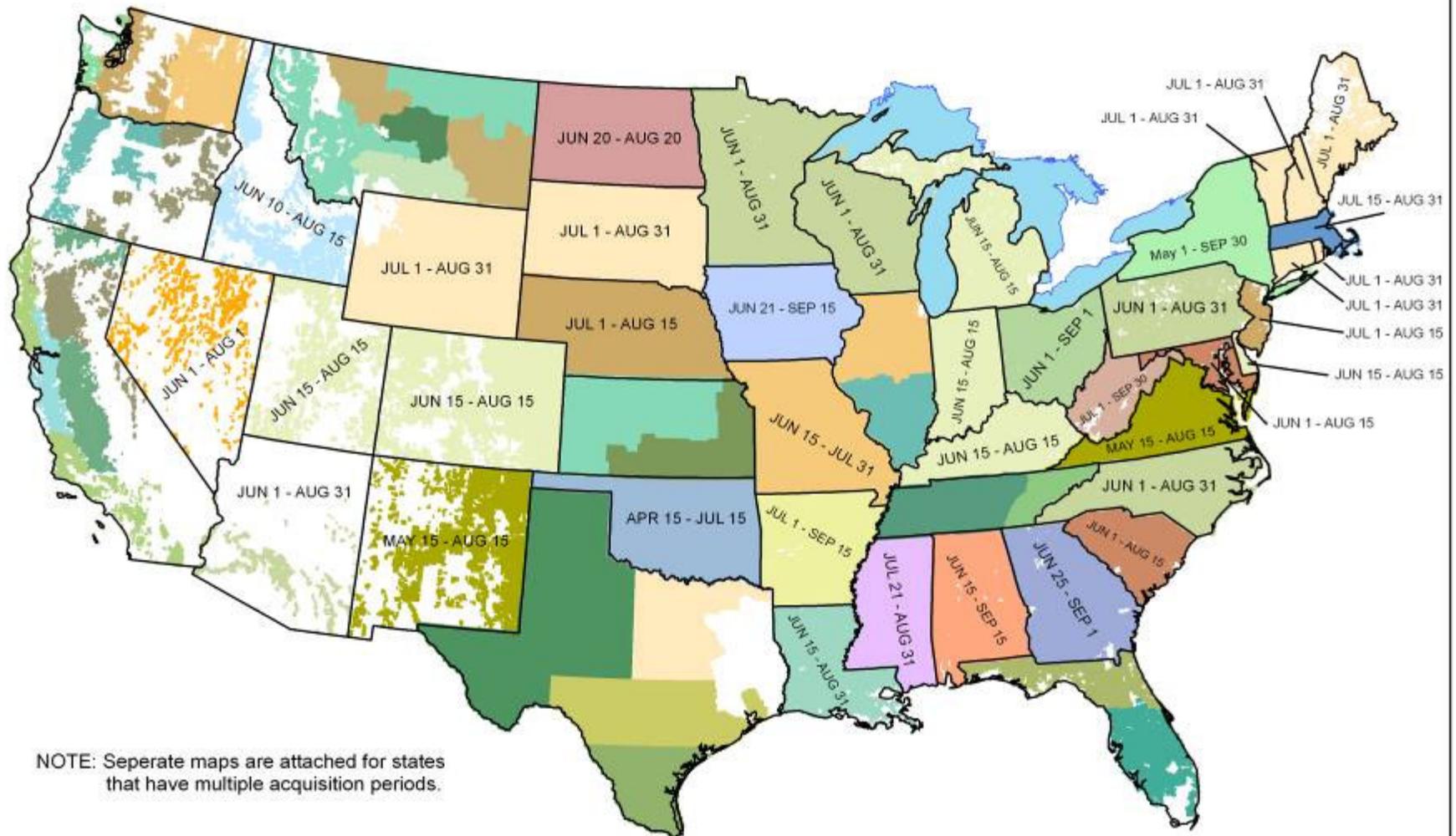
- USDA/Farm Service Agency/APFO
 - <http://www.apfo.usda.gov>
- USDA Geospatial Data Gateway
 - <http://datagateway.nrcs.usda.gov/>
- APFO Geodata Warehouse (ArcIMS)
 - gdw.apfo.usda.gov
 - Contains imagery (MDOQs & NAIP organized by UTM zone) and vector data sets
- APFO Sales Section
 - (801) 844-2922 apfo.sales@slc.usda.gov
 - David Parry, sales section supervisor (801)844-2923 david.parry@slc.usda.gov



CLU information

- CLU data for release to the general public includes the following attribute data:
 - Shape & Calculated Acres
- Because sensitive information is contained in the full CLU attribute data, it is not releasable to the general public or most other government agencies.
- New FOIA regulations may change data that can be released with CLU

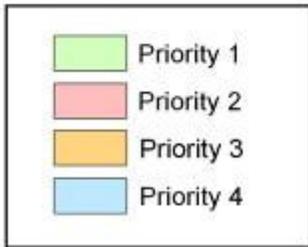
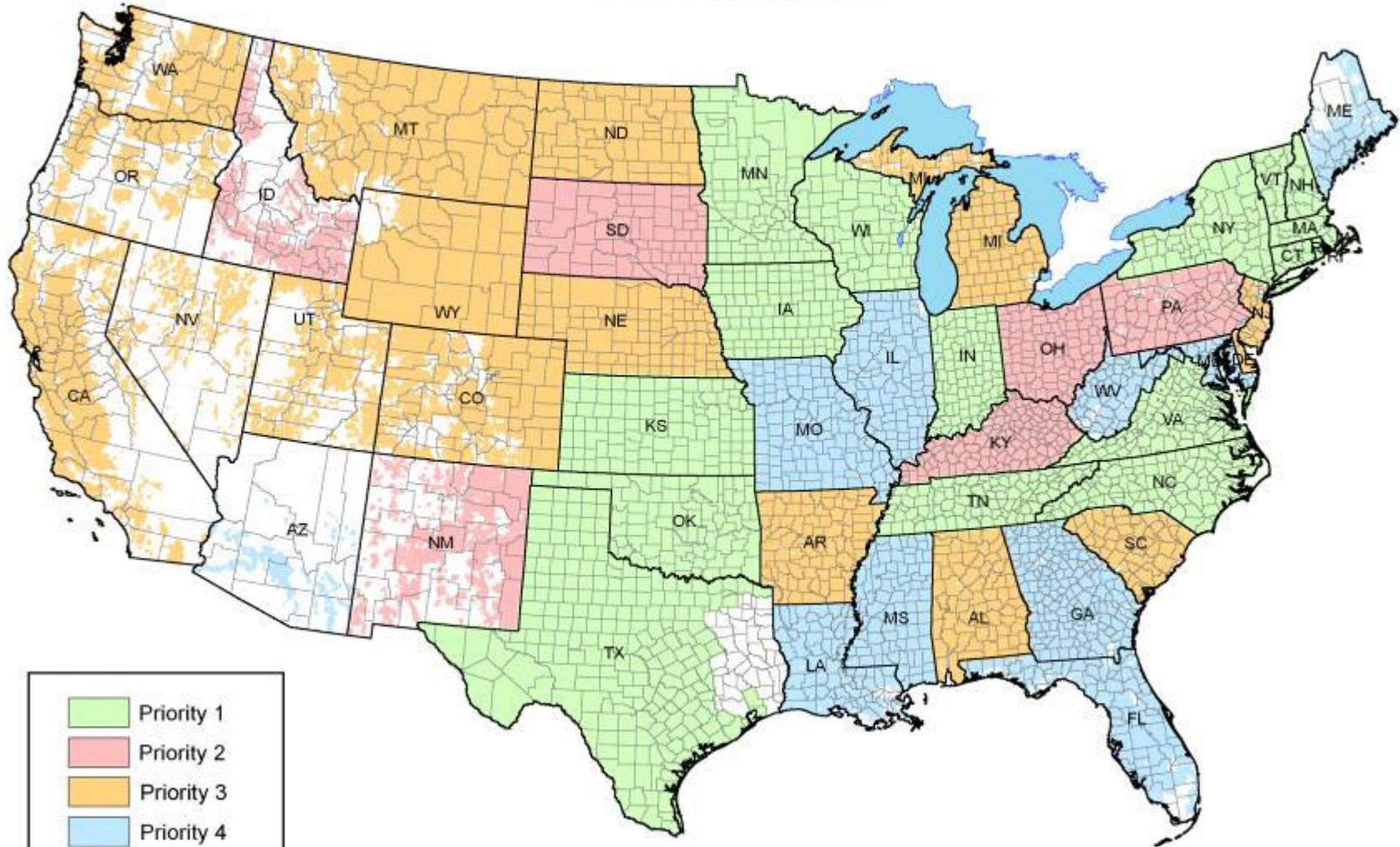
2008 NAIP ACQUISITION PERIODS



NOTE: Separate maps are attached for states that have multiple acquisition periods.

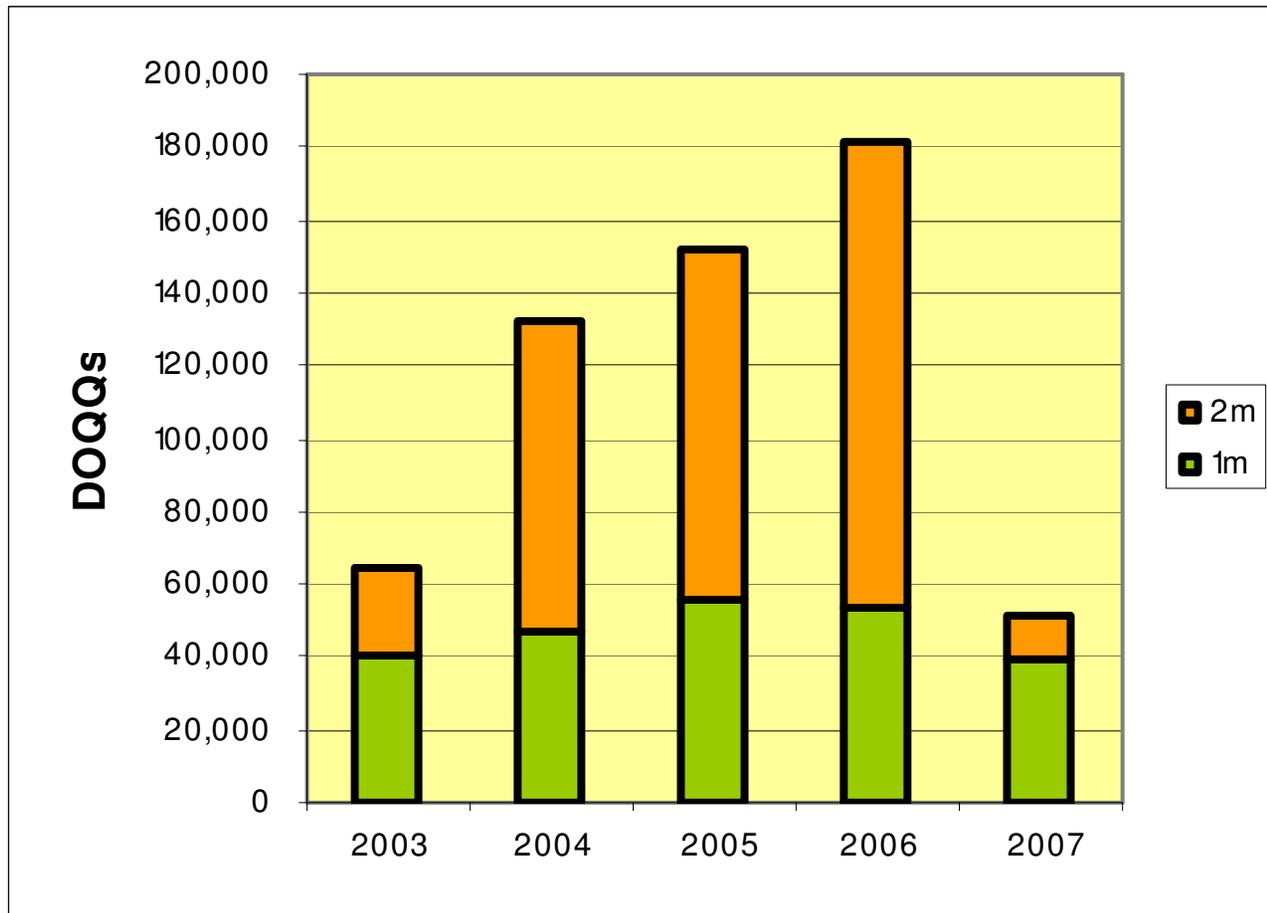
2008 NAIP Coverage

1 Meter Resolution



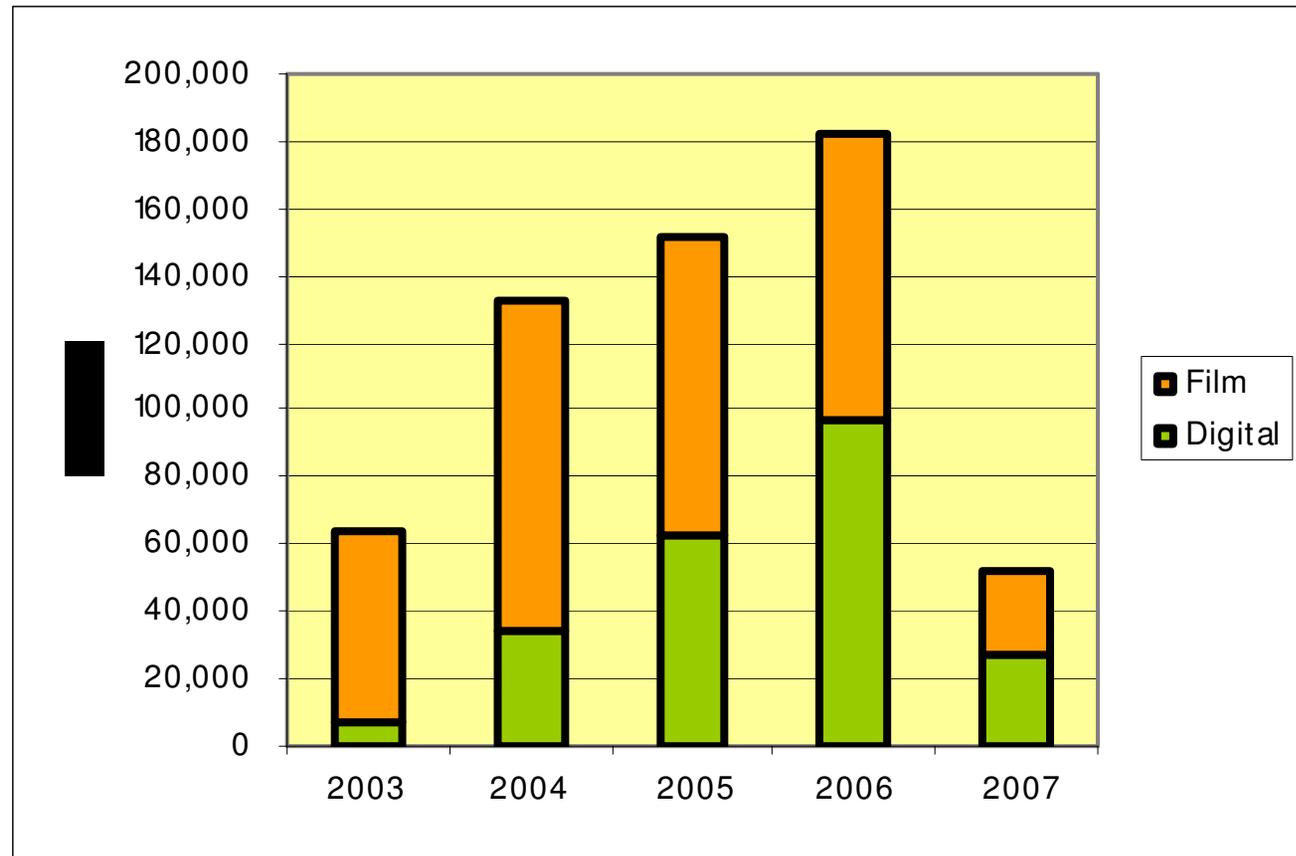


NAIP Acquisition Rate





Digital vs Film Totals





Direct Digital Capture

